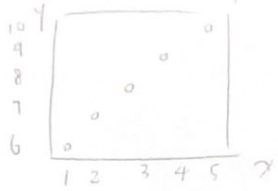1.1 What's R studio & why should you download it?

```
x <- 1:5
y <- 6:10
plot(x,y)
```


1.2 Download & install R & R studio

1.6 Exporting Data from R

```
write.table(DataToExport, file="ExportedFileName.csv", row.names=F, sep=";")
```

Subject	Age		Subject	age
1	Ryan	→	Ryan	53
2	Hi		Hi	54

1.7 Importing Data in R

```
Data1 <- read.table(file.choose(), header=T, sep="\t")
```

1.8 working with Data

* names(LungCapData)
  "LungCap" "Age" "Height "Smoke" ...

* mean(LungCapData$Age)   Mean(Age) is wrong !!

* class(Smoke)   "factor"
  levels(Smoke)   "no" "yes"

1.11 Setting Up Working Directory in R

```
getwd()
setwd("/Users/Ryan/Desktop")
```

　用~取代

getwd 改变

1.12 writing scripts in R

1.3 Basic Arithmetic

① x = 11、print(x) or x 不能大写X、y ≤ 7 和 "=" 一样意思

② ls()   list

③ rm(y)   remove

④ x.1 <- 14、1x <- 22 (不可)、xx <- "marin"、yy <- "1"   ← character not number

⑤ > 11+14、7*9、x+y、z <- x+y、y^2、sqrt(y)、log(y)、exp(y)、
   log2(y)、abs(-14)
                 絕對值

⑥ > sqrt(y   ⑦ (#) the code below is for...

   ⊕ 代表不完整

   +)

   [1] 3

1.4 Vectors、Matrices   concatenate 串接

class ① > x1 <- c(1,3,5,7,9)   左边结果   gender <- c("male", "female")
         > x1   numeric [5]   右边结果
         [1] 1 3 5 7 9   character [2]

                                                  x <- c(34, "Hey")
② 2:7   字串吗? [1] "34" "Hey"
   [1] 2 3 4 5 6 7

③ seq(from=1, to=7, by=1)   1, 2, 3, 4 ....., 7   sequence
   seq(from)=1, to=7, by=1/3)   1, 1.333..., 1.666...., ..., 7

④ rep(1, times=10)   1, 1, 1, ... 1
repeat   10個

   rep("marin", times=5)

   rep(1:3, times=5)

   rep(seq(from=2, to=5, by=0.23), times=5)

   rep(c("m","f"), times=5)

⑤ x <- 1:5   左边结果
    x   integer [5]
    [1] 2 3 4 5)

    x + 10

⑥ y <- c(1,3,5,7,4)

\# if two vectors are of the same length, we may add/- × ÷

\# corresponding elements

⑦ y[3]   y[-3]   y[1:3]   ✗ y[c(1,5)]   y[-c(1,5)]

                  1 3 7 9   1 3 5   1 9   3 5 7

   [1] 5

   y[y<6]

   [1] 1 3 5

⑧ matrix(c(1,2,3,4,5,6,7,8,9), nrow=3, byrow=TRUE)   以 row 排列 ↑   Column ↑ FALSE

   mat <- matrix(c(1,2,3,4,5,6,7,8,9), nrow=3, byrow=TRUE)

   右边出现 3×3 double matrix

                      第1&3列   all column

        列 栏

⑨ mat[1, 2]   mat[c(1,3), 2]   mat[2,]   mat*10

                  2 8   4 5 6

   [1] 2

1.5 Import Data

Excel先 .csv or .txt.

help(read.csv) or ?read.csv   相当於 TRUE

data1 <- read.csv(file.choose(), header = (T))   separate

or

data2 <- read.table(file.choose(), header=T, sep=";")

1.9 attach(LungCapData)

LungCapData[11:14,]

     列 栏

mean(Age[Gender == "female"])

FemData <- LungCapData[Gender == "female",]

dim(FemData)

[1] 358 6

   列 栏

1.10 Logic statements

```
Age[1:5]
temp <- Age>15
temp[1:5]
[1] F  T  T  F  F
temp2 <- as.numeric(Age>15)
temp2[1:5]
[1] 0  1  1  0  0
         ↓     ↓
      False  True
MoreData <- cbind(LungCapData, temp)
MoreData[1:5,]
```

1.13   多一栏
```
install.packages("epiR")
library(epiR)   每次都要叫出来
```

1.15
```
apply(x=StockData, MARGIN=2, FUN={ mean
                          栏              Max
                                 quantile, probs=c(0.2, 0.8)
                                 plot, type="l"  }  )
```

Stock2 从 NA 变 1.46

```
plot:   main="stock"
        ylab="Price"
        xlab="Pay"
apply(x=StockData, MARGIN=1, FUN=sum)
                                3)
```

1.14 customizing the look

Tools→options→appearance   改变外观   eg. eclipse

1.16 Tapply
```
tapply(x, INDEX, FUN=NULL, na.rm=T).
         ↑     ↑        ↑
        Age  smoke    mean.
            no   yes
         12.035  14.779   Age的平均
```

* tapply (Age, Smoke, mean, simplify = F).
     $No : 12.03
     $yes : 14.77
* mean (Age [smoke == "no"])   12.03.

* tapply (Age, Smoke, Summary)
     $no : Min.   1st Qu.   Median   ...

     $yes:
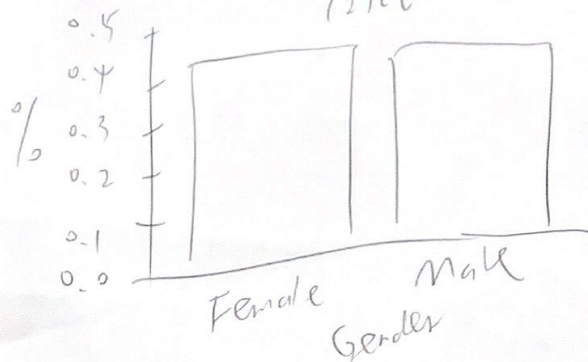
* tapply   (Age, list (Smoke, Gender), mean, na.rm = T)

	female	male
no		
yes		

2-1   Bar Charts and Pie Charts
     percent <- table (Gender) /725
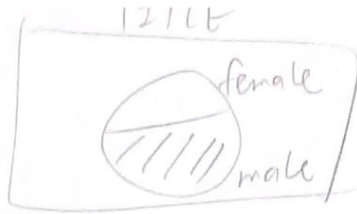   barplot (percent, main ="TITLE", xlab =" Gender", ylab ="%", las =1,
          names. arg = c ("Female", "Male"))

TITLE bar chart: y-axis labeled "%" with values 0.0, 0.1, 0.2, 0.3, 0.4, 0.5; x-axis labeled "Gender" with bars "Female" and "Male"

pie(count)

pie(count, main="TITLE")

box()

2.2 Boxplots & Grouped Boxplots

* boxplot (LungCap)

* quantile (LungCap, probs = c(o, 0.25, 0.5, 0.95, 1))

```
0%     25%    50%   75%   100%
0.5    6.2    8.0   9.8   14.7
```

* boxplot (LungCap, main="Boxplot", ylab="Lung Capacity", ylim = c(0,16), las=1)

Boxplot

* boxplot (LungCap ~ Gender, main="Boxplot by gender")

Boxplot by gender